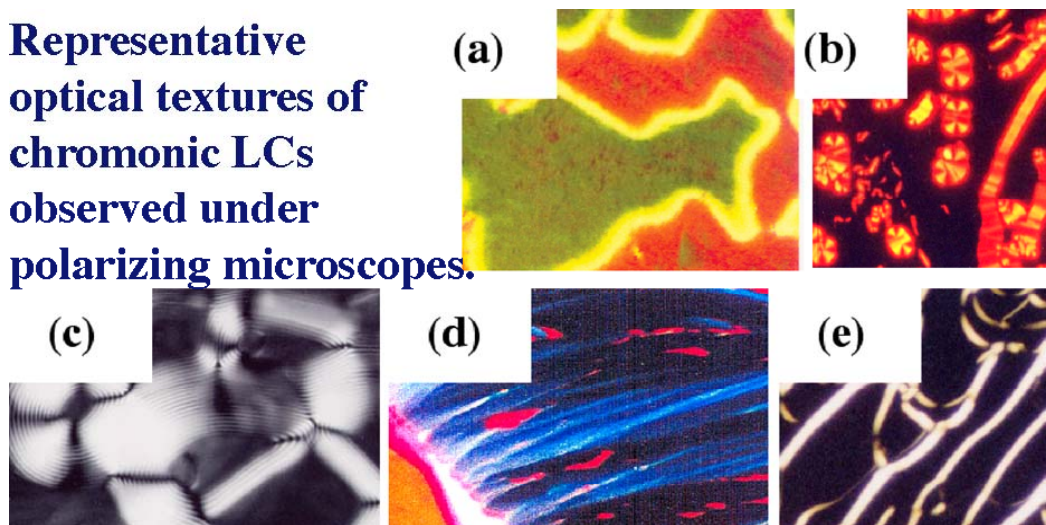# Micro- and Nano-scale Anisotropic Organic Materials via Self-Organization of Lyotropic Chromonic Liquid Crystals

Suk-Wah Tam-Chang and Sean M. Casey
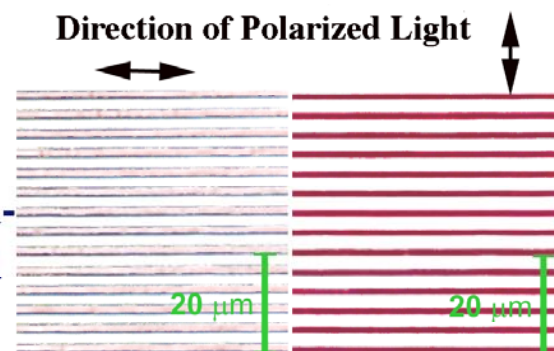University of Nevada, Reno, DMR0405532

Research Goals: **1**. To further our understanding of the structural factors governing supramolecular interactions, optical properties, and liquid crystalline (LC) properties of ionic aromatic compounds. **2**. To design and synthesize long-wavelength and near infrared (NIR) absorbing compounds. **3**. To develop novel approaches to the micro- and nano-fabrication of anisotropic (direction-dependent) materials.

Representative optical textures of chromonic LCs observed under polarizing microscopes.

(a) (b) (c) (d) (e)

Micropattern of anisotropic organic materials showing direction-dependent optical properties.

Direction of Polarized Light
20 μm   20 μm

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Education goals:

1. Introduces to students the basic knowledge and techniques for studying organic materials.

2. Provides research opportunities to both graduate and undergraduate students (including underrepresented groups).

3. Prepare students for a career that may include organic materials research in industry and improving their access to a teaching career in science.

Broader Impacts on Society:

1. Many useful materials (e.g., polarizers) and devices (e.g., liquid crystal displays) depend on the self-organization of organic compounds into an ordered crystalline phase or a LC phase at some step in the manufacturing process or during the functioning of the device. The knowledge we gain from this research could further polarization and display technologies.

2. Colored compounds, long-wavelength dyes and NIR materials have important uses that range from basic science to high technology applications.

3. The development of novel approaches to generating nanopatterns of anisotropic organic materials may offer new opportunities to the rapidly advancing fields of nanoscience and nanotechnology.